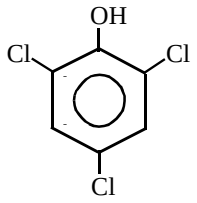
2,4,6-TRICHLOROPHENOL

2,4,6-Trichlorophenol is a federal hazardous air pollutant and was identified as a toxic air contaminant in April 1993 under AB 2728.

CAS Registry Number: 88-06-2

Molecular Formula: $C_6H_3Cl_3O$



2,4,6-Trichlorophenol is a colorless needle or yellow solid that has a strong phenolic odor (Sax, 1989). It is volatile with steam but not from alkaline solution (Merck, 1989). 2,4,6-Trichlorophenol is soluble in acetone, benzene, carbon tetrachloride, diacetone alcohol, ether, denatured alcohol formula, methanol, pine oil, stoddard solvent, toluene, turpentine, and water. It is also soluble in hot acetic acid (HSDB, 1991). It is stable up to its melting point and emits toxic fumes of chlorine when heated to decomposition (Sax, 1989).

Physical Properties of 2,4,6-Trichlorophenol

Synonyms: trichlorfenol

Molecular Weight:	197.46
Boiling Point:	246 °C
Melting Point:	69 °C
Vapor Density:	1.4901 at 20/4 °C (water = 1)
Vapor Pressure:	0.012 mm Hg at 25 °C
Log Octanol/Water Partition Coefficient:	3.69
Conversion Factor:	1 ppm = 8.1 mg/m^3

(HSDB, 1991; Merck, 1989; U.S. EPA, 1994a)

SOURCES AND EMISSIONS

A. Sources

2,4,6-Trichlorophenol is used as a wood and glue preservative, and in leather tanning and finishing (HSDB, 1991). 2,4,6-Trichlorophenol has been detected in the emissions from fossil fuels, combustion, municipal wastes incineration, and chlorination of phenol-containing waters (Howard, 1990).

The primary stationary sources that have reported emissions of 2,4,6-trichlorophenol in California are sanitary services (ARB, 1997b**)**.

B. Emissions

The total emissions of 2,4,6-trichlorophenol from stationary sources in California are estimated to be 1 pound per year, based on data reported under the Air Toxics "Hot Spots" Program (AB 2588) (ARB, 1997b).

C. Natural Occurrence

2,4,6-Trichlorophenol is not known to occur as a natural product, but it may be formed during forest fires (HSDB, 1991).

AMBIENT CONCENTRATIONS

No Air Resources Board data exist for ambient measurements of 2,4,6-trichlorophenol. However, the United States Environmental Protection Agency (U.S. EPA) has compiled ambient air data from Portland, Oregon and Columbia, South Carolina. The U.S. EPA reported a mean concentration of 0.15 nanogram per cubic meter (ng/m^3) in Portland during 1984 and 0.29 ng/m^3 in Columbia during 1989 (U.S. EPA, 1993a).

INDOOR SOURCES AND CONCENTRATIONS

No information about the indoor sources and concentrations of 2,4,6-trichlorophenol was found in the readily-available literature.

ATMOSPHERIC PERSISTENCE

Based on its vapor pressure, 2,4,6-trichlorophenol will exist in the atmosphere largely in the gas phase. 2,4,6-Trichlorophenol will be removed by its reaction with photochemically-produced hydroxyl radicals. It is expected to be less reactive than dichlorophenols towards the hydroxyl radical. Therefore, using the rate constants for the reactions of the hydroxyl radical with 2,3- and 2,4-dichlorophenol (Atkinson, 1989), the gas-phase reaction with hydroxyl radicals is expected to lead to a half-life for 2,4,6-trichlorophenol of at least 7 days (Atkinson, 1995).

AB 2588 RISK ASSESSMENT INFORMATION

The Office of Environmental Health Hazard Assessment reviews risk assessments submitted under the Air Toxics "Hot Spots" Program (AB 2588). Of the risk assessments reviewed as of April 1996, 2,4,6-trichlorophenol contributed to the total cancer risk in 2 of the approximately 550 risk assessments reporting a total cancer risk equal to or greater than 1 in 1 million (OEHHA, 1996a).

HEALTH EFFECTS

The probable routes of human exposure to 2,4,6-trichlorophenol are inhalation and ingestion.

Non-Cancer: No studies are available on the acute effects of 2,4,6-trichlorophenol in humans through inhalation or oral exposure. Occupational exposure to 2,4,6-trichlorophenol was associated with respiratory system effects in the only available chronic inhalation study. Cough, chronic bronchitis, wheezing, altered pulmonary function, and pulmonary lesions were observed (U.S. EPA, 1994a).

The U.S. EPA has determined that there are inadequate data to establish a Reference Concentration (RfC) for 2,4,6-trichlorophenol, and has not established an oral Reference Dose (RfD) (U.S. EPA, 1994a).

No studies are available on adverse developmental or reproductive effects of 2,4,6-trichlorophenol in humans. Offspring from rats orally exposed to 2,4,6-trichlorophenol were found to have transient reduction in body weight. In one study, reduced mean litter size was observed in rats following maternal exposure to 2,4,6-trichlorophenol in drinking water (U.S. EPA, 1994a).

Cancer: No studies are available on the carcinogenic effects of 2,4,6-trichlorophenol in humans from inhalation or oral exposure. Oral exposure in rats has been observed to cause leukemia and liver cancer (U.S. EPA, 1994a).

The U.S. EPA has classified 2,4,6-trichlorophenol as Group B2: Probable human carcinogen, with an inhalation unit risk estimate of 3.1×10^{-6} (micrograms per cubic meter)$^{-1}$. The U.S. EPA estimates that, if an individual were to breathe air containing 2,4,6-trichlorophenol at 0.3 micrograms per cubic meter ($\mu g/m^3$) over his or her entire lifetime, that person would theoretically have no more than a 1 in 1 million increased chance of developing cancer (U.S. EPA, 1994a). The International Agency for Research on Cancer (IARC) has classified 2,4,6-trichlorophenol as Group 2B: Possible human carcinogen, based on sufficient evidence in animals (IARC, 1987a).

The State of California has determined under Proposition 65 that 2,4,6-trichlorophenol is a carcinogen (CCR, 1996). The inhalation potency factor that has been used as a basis for regulatory action in California is 2×10^{-5} (microgram per cubic meter)$^{-1}$ (OEHHA, 1994). In other words, the potential excess cancer risk for a person exposed over a lifetime to 1 $\mu g/m^3$ of 2,4,6-trichlorophenol is estimated to be no greater than 20 in 1 million. The oral potency factor that has been used as a basis for regulatory action in California is 7.0×10^{-2} (milligram per kilogram per day)$^{-1}$ (OEHHA, 1994).